

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

## PATENT SPECIFICATION

EXAMINER'S

COPY

DIV. 33

540.881

Application Date: March 26, 1940. No. 5392/40.

Complete Specification Left: Feb. 5, 1941.

Complete Specification Accepted: Nov. 4, 1941.



## PROVISIONAL SPECIFICATION

## Improvements in or relating to Buildings or Structures

I, ROBERT GREENWOOD TARRAN, of The Wolds, Beverley High Road, in the City and County of Kingston-upon-Hull, a British Subject, do hereby declare the nature of this invention to be as follows:—

The present invention relates to buildings or structures, and to materials for the construction thereof.

10 This invention is particularly applicable to buildings such as huts, sheds, barns and similar structures, and has for its primary object the provision of means, in the nature of units or slabs, which can be readily and economically produced and assembled to construct a building which, when so erected, will be possessed of excellent insulating qualities and of regular character in regard to both its inner and outer surfaces.

Further objects of the invention are the construction of a building from prefabricated units, of substantially similar form, the elimination of spoutings and fall-pipes, and the provision of a structure which can be readily dismantled and rendered portable.

According to the present invention, a building is constructed of a plurality of monolithic or composite slabs or units, each curved longitudinally and straight or plano-concave in lateral section, such slabs being assembled end to end to form the sides and roof of a building, with the latter gradually merging into the former so as to produce a preferably segmental oval cross section of the building.

In another aspect of the invention, the units may be in the form of arcuate trays, of concrete, terra cotta, wood, or other material, having a frame of wood integral therewith or attached thereto, whereby a very strong and light slab can be obtained. Preferably, the unit is constituted by a concrete slab bounded by a wood frame composed of strips keyed or secured to the slab by any desired means.

In considering the cross section of a building constructed in accordance with the present invention, the cross sectional shape is substantially parabolic or, again, of segmental elliptical shape with the base of the section coinciding with

the minor axis of the ellipse. The cross section of the building contains the longitudinal cross sections of a series of units, constituting the periphery of the structure, with each unit of the series arranged in the disposition of a voussoir to the arc of the section.

Accordingly, the units are longitudinally curved in conformity with the cross-sectional shape of the periphery of the building, and are contiguously arranged to constitute the arc of the section with the units forming the roof of the building gradually merging into the units forming the walls.

Longitudinally, the building is substantially rectangular in shape with the abutting transverse edges of each series of units disposed longitudinally of the building and with the transverse edges of units arranged in staggered relationship or, in other words, with the units or slabs laid to broken bond. Provision is made in the curved side walls of the building for the reception of window frames and the like, the width of the apertures therefor conveniently coinciding with the width of two adjacent series of units.

Preferably, each unit consists of a slab of concrete or the like material in the form of a curved tray having a bounding frame of wood, the strips forming the longitudinal side members of the frame upstanding from the concave face of the tray and, to a less extent from the members forming the transverse edges of the frame. The units are preferably preformed and have the longitudinal side members keyed into the slab, which may be curved transversely, whilst the said longitudinal frame members may be also tied together during the process of manufacture of the units, the transverse members of the frame being secured to the longitudinal members and, if desired, be similarly keyed to the slab.

Thus, in constructing a building from the units, series of the units are arranged contiguously to form the segmental sections of the building, and the series are interconnected by the passage of nails, screws, bolts or the like through the abutting circumferential ribs formed by

the side members of the units. Alternatively, the series of units may be interconnected by means of suitable metallic clips or by similar device or operation.

- 5 The exterior of the structure is thus of regular surface and is devoid of projections, angles or intersections. The said outer surface may be readily covered with a shrouding of weatherproofing material, the application of which will not detract from the regular nature of the building.

- 10 Similarly, the interior surface of the building is free from excrescences, and the application to the interior surface of a wall-boarding results in the provision of a wall of cellular structure.

It will be readily appreciated that the

wood frame members of each individual unit provides a ready means of attachment of the interior and exterior coverings and also for the attachment of appointments to the inner walls.

As already described, the units are disposed with their abutting transverse edges in staggered relationship. Accordingly, the units of what can be regarded as the longitudinal first course alternate in height between horizontal lines.

Dated this 21st day of March, 1940.

W. P. THOMPSON & CO.,  
Friary Chambers, Whitefriargate, Hull,  
and

12, Church Street, Liverpool, 1,  
Chartered & Registered Patent Agents.

## COMPLETE SPECIFICATION

### Improvements in or relating to Buildings or Structures

- 30 I, ROBERT GREENWOOD TARRAN, of The Wolds, Beverley High Road, in the City and County of Kingston-upon-Hull, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to buildings or the like structures.

- 40 The invention is particularly applicable to buildings such as huts, sheds, barns and similar structures and has for its primary object the construction of a building in an economical manner from substantially similar units or slabs, which building when erected, will be possessed of excellent insulating qualities and be of regular character with regard both to its inner and outer surfaces.

- 50 Suggestions have already been made to form an air raid shelter or a roofing structure of curved metal body sections laid to broken bond, and in one form of construction each of the sections is provided with longitudinal side flanges integral with the web and adapted for connection with the flanges of adjacent sections by means of bolts.

- 60 In another proposal, at each longitudinal section of a shelter, each side and half of the roof is formed of a curved slab consisting of a concrete web with integral longitudinal side flanges by which slabs of adjacent sections are interconnected by bolts.

- 65 It has also been proposed to construct a flat wall of a structure by means of wooden trays formed of wooden webs with longitudinal side flanges of wood, the latter being connected to similar

flanges of adjacent trays by bolt means.

According to the present invention the side walls and roof of a building or other structure are made up of a plurality of curved non-metallic rigid slabs or the like units, each having a curved web and similarly curved and co-extensive longitudinal wooden side flanges rigidly connected thereto, the said units being laid to broken bond with the flanges located internally of the structure and being rigidly interconnected by bolts, screws, nails or clips applied to the abutting longitudinal side flanges of laterally adjacent slabs, whilst the connecting joints are shrouded externally by weatherproof material.

The invention is more particularly described with reference to the accompanying drawings, in which:—

Figures 1 and 2 are perspective views of substantially continuous left and right hand end portions of a building according to the present invention, said views showing different sections of the building in different stages of completion for the purpose of demonstrating how the slabs, trays or other units are erected to form the building.

Figure 3 is a perspective view of a curved slab, tray or other unit from which the entire surface other than the end walls of the building is made up.

Figure 4 is a lateral section of the slab of Figure 3 taken through an integral rib adjacent one end thereof.

Figure 5 is a diagrammatic transverse section of the building according to Figures 1 and 2.

Figure 6 is a detail showing one manner of interconnecting adjacent slabs

or other units of the end walls, the slabs of the side walls and the roof with which they merge being similarly interconnected.

5 Figure 7 is a detail showing one manner in which the lowermost slabs of a side wall may be connected to the base or foundation of the structure.

10 Figure 8 is a perspective view of a modified form of structure according to the present invention and showing various sections of the building in different stages of completion.

15 Figure 9 is a perspective view of a curved slab or unit from which all but the end walls of the structure according to Figure 8 is erected.

Figure 10 is a longitudinal section of the unit according to Figure 9.

20 Figure 11 is a detail showing how the lowermost unit of a side or end wall of the construction according to Figure 8 may be connected to the foundation of the building.

25 Figure 12 is a detail showing one manner in which the wooden units of Figure 8 are interconnected.

In the construction according to Figures 1-7, the side walls and roof of the building comprise a plurality of 30 curved units 20, 36, laid to broken bond, that is to say, with their abutting transverse edges in staggered relationship with the units, of what can be regarded as each longitudinal first course, alternating in 35 height between horizontal lines. Similarly end units 21 are laid to broken bond, said end units being flat as distinct from curved.

40 Each unit 20 or 36 consists of a longitudinally curved web 22 of concrete, which, for the purpose of this specification, means any artificial material wherein the filler is sand, sawdust, or other 45 powdered or granular material and the binder is cement.

The web, being relatively thin, is of light structure and at its ends has integral with it a pair of ribs 23 which 50 are reinforced by metallic wires 24 spot welded or otherwise rigidly connected to nails 25 driven through longitudinally curved side wooden ribs or flanges 26, which are co-extensive with the web. 55 Thus, in the formation of a slab, tray or the like unit 20, 36, the flanges 26 are first mounted on a frame with the nails 25 of opposite flanges interconnected by the reinforcements 24, whereupon the concrete web 22 is moulded between the 60 flanges with the ribs 23 surrounding the reinforcements 24.

It will be observed that in the particular form of construction shown in 65 Figures 3 and 4 the lateral end ribs 23

which are integral with the web 22 project inwardly of the curvature of the web to a smaller extent than the inward projection in the direction of the web curvature of the wooden longitudinal ribs or 70 flanges 26, and that when considered externally the outer longitudinal edges of the wooden flanges 26 lie on the same surface as that of the outer face of the curved web. The ribs 23 may, however, extend 75 inwardly to such an extent as to lie flush with the wooden flanges 26.

Again, as will be seen from Figure 3 the web 22 considered at any lateral section through both opposite flanges 26 80 has a concave inner surface, whilst externally at any section the outer surface is represented by a straight line including the outer edges of the flanges 26. Thus, the web is plano-concave 85 in lateral section. The end units 21 are also formed of concrete webs with wooden flanges, the only difference between such units and the units 20, being that the end units are flat, whilst if desired the webs 90 may be of constant thickness between the side flanges 26.

Where it is desired to erect a building according to the present invention on a concrete foundation 27, this is provided 95 with inner and outer channels 28 and 29 extending along all four sides of the foundation. The inner channel 28 is of rectangular form and is wide enough to receive a base of each slab or unit constituting the lowermost course and a 100 board or the like connected to the flanges 26 of the slabs. The concrete foundation preferably may have a hard core 30 with a rough layer 31 between it and the upper 105 layer, whilst the foundation adjacent the walls may have a damp course 32.

110 Preferably in the erection of a building, one end wall is first assembled from preformed flat slabs 21 with each unit in engagement with two of the units in the course next below it as shown in Figure 1 or 6. The flanges 26 of laterally adjacent units are interconnected by means 115 such as bolts, nails, screws, or clips and as can be seen from Figure 6 which illustrates the bolt method of interconnection each flange 26 of the unit has four holes formed therein to receive the bolts by which it is interconnected to the flanges 120 of the two units adjacent to it. Thus, the unit A of Figure 6 is interconnected with the units B, C, D and E by means of bolts 33, adjacent the four corners of the unit A and also by bolts 34 which pass 125 through holes formed in the centres of the flanges 26 of the unit A and in the corners of the units B, C, D, and E. It will be seen from examination of Figure 6 that the unit A is not directly con- 130

5 nected with the adjacent or abutting units F and G of the same vertical series, but in fact is indirectly connected thereto by virtue of the flange connections with the units E and D on one side and the units B and C on the other.

10 Where, instead of bolts it is preferred to use screws or nails, then such screws or nails are driven home in a direction away from a corner of a unit and towards the centre of a longitudinal flange of the adjacent unit in a manner illustrated in the modification according to Figure 12.

15 Thus, of the four nails or screws by which each longitudinal flange 26 is connected to the two half longitudinal flanges of the next adjacent unit, two screws or nails are driven in one direction and the other two in the opposite direction between the flanges.

20 Where the structure is to be of particularly temporary character and the use of bolts or screws is not desired, the flanges may be interconnected by spring clips of U or C shape, i.e., with the relatively flat limb parts engaging with the inner faces of the abutting flanges of the units and the curved part of the clip constituting a resilient yoke for holding the limbs in their clamping position above said flanges.

25 The space which would otherwise be taken up by the lowermost half unit and the next higher complete unit of the middle series of units in the end wall, is in fact taken up by a door 35.

30 After the end wall has been completed the curved walls and roof are erected, the work proceeding longitudinally of the building, with the first series of curved units having a rabbeted engagement with the edge units of the end wall. The units are interconnected in a manner similar to that already described with regard to the end units and it will be appreciated that in forming the roof and opposite sides of structures of the type shown in the drawing, the units 20 and sides constituting a continuous curve of parabolic appearance made up of circular arcs of different radii, it is only necessary to utilise preformed units or part units of two different curvatures. Thus, in erecting a building having the cross section illustrated in Figure 5 the units 20 forming the sides may be of one curvature represented by the radius centres 19 whilst the units 36 forming the roof may constitute arcs about a centre 58. By virtue of the fact that the centre 58 is located on radii of the uppermost slabs 20 at the left and right hand sides of Figure 5, it will be appreciated that the sides and roof constitute a continuous

curve of parabolic appearance of which the first 90° is taken up by two arcs of different radii and the remaining 90° is subtended by a mirror image of said arcs.

70 In the section according to Figure 5 the lowermost units are constituted by half slabs and the curve of smaller radius representing the roof is taken up by three curved units.

75 In longitudinally adjacent lateral sections where the lowermost units of the side walls are constituted by complete slabs as distinct from half slabs, the roof part is made up of two curved slabs 36 the ends of which abut at the mid-vertical plane longitudinally of the structure. This can be seen from examination of the left hand end of Figure 1. In addition, in such adjacent lateral sections each of the units abutting against one of the two uppermost units has two curvatures, the upper half being curved similarly to the roof unit 36, and the lower half similarly to the side wall units 20.

80 As will be seen from Figure 1, in the formation of the side walls of a structure the units representing the second course commencing at the second series of units and continuing in every subsequent fourth unit longitudinally of the structure, are eliminated and their places taken by window frames 37.

85 It will be appreciated that with the exception of the window frames and a flue 48 or ventilator, the outer curved surface of the structure is free from projections and accordingly it is a relatively simple matter to apply sheets of weather-proof material 38 over the units and particularly across the joints between abutting series of units with the sheets laid in overlapping relationship. As shown in Figures 1 and 7 the base of the side walls may be covered by horizontally laid overlapping sheets 39 of weatherproof material, the lowermost sheet extending into the channel 29.

90 It will be appreciated that the surface of the composite units 20, 21, 36, may be covered by a bituminous or the like substance, in which may be embedded a number of strips for covering the joints between adjacent units.

95 Internally of the structure, wall boards 40 may be secured in any desired manner to the innermost edges of the flanges or ribs 26 of the units, the lowermost board extending with the flanges 26 into the channels 28. In this way cavities are formed between the wall-boards and the webs of the slabs. The foundation may be covered by linoleum 41 and a surround 42 provided to constitute bed stops, i.e., for preventing beds or other furni- 130

ture being pushed against the walls.

In the modification according to Figures 8—12, each curved unit 20, 36, for forming the side walls and roof, is made up of side wooden flanges 26 interconnected by a series of lateral boards 43, the ends of which where they are nailed to the flanges, being rabbeted to assist in effecting a firm joint.

With the exception of the end walls the structure according to Figure 8 is thus made up of a number of units 20, 36, each constructed on the lines illustrated in Figures 9 and 10, the lowermost unit of each series being connected to the foundation 45 by screwing it to bearers 46 and bolting the bearers to the foundation member (Figure 11). The end walls may either be made up of units similar to that of Figures 9 and 10 but flat, or they may be made up of a series of panels each constituted by vertically disposed boards suitably carried between vertical uprights as shown at 47 in Figure 8.

Where the wooden structure is for a relatively small building, i.e., smaller than that illustrated in Figures 1 and 2 the windows may be provided in the end walls in which event with the solitary exception of the flue 48 or a ventilator in the roof the outer curved surface of the structure is free of projections and lends itself admirably to the fixing of the weatherproof sheets in overlapping relationship, care being paid particularly to covering the joints between abutting flanges of adjacent series of units.

As shown in Figures 8 and 11 the weatherproof sheeting 38 may project downwardly over the bearers 46 and beyond the top of the foundation 45.

The units may have a web of terra cotta, with wooden flanges adapted for connection with the flanges of adjacent units by metallic means such as bolts, nails, screws or clips.

Attention is drawn to Patent Specification No. 1553/41 (Serial No. 540,902) wherein there is claimed a building slab or the like unit in which a concrete web part which is curved longitudinally but externally is laterally straight, has rigidly connected to it a pair of similarly curved and wooden flanges co-extensive with and extending from the opposite longitudinal side edges of the web in a direction inwardly of the curve thereof, said flanges lying normal to the web and constituting the means by which adjacent slabs are interconnected in flanged abutting relationship.

Attention is also drawn to Patent Specification No. 1554/41 (Serial No. 540,903) wherein there is claimed a building slab in which wooden flanges,

co-extensive with and rigidly connected to a longitudinally curved wooden web part, extend normally from and at opposite longitudinal side edges of said web part in a direction inwardly of the curve to constitute the means by which adjacent longitudinally curved slabs are interconnected in flanged abutting relationship.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A building or the like structure the side walls and roof of which are made up of a plurality of curved non-metallic rigid slabs or the like units, each having a curved web and similarly curved and co-extensive longitudinal wooden side flanges rigidly connected thereto, the said units being laid to broken bond with the flanges located internally of the structure and being rigidly interconnected by bolts, screws, nails or clips applied to the abutting longitudinal side flanges of laterally adjacent slabs, whilst the connecting joints are shrouded externally by weatherproof material.

2. A building or the like structure as claimed in claim 1 in which the curvature of the slabs is such that slabs forming the side walls of the structure present curves continuous with that of the roof slabs.

3. A building or the like structure as claimed in claim 1 in which each slab is connected solely to slabs of laterally adjacent sections.

4. A building or the like structure as claimed in claim 1 in which the slabs forming the roof and opposite sides, at any lateral section of the structure, extend in a continuous curve of parabolic appearance but made up of circular arcs of different radii.

5. A building or the like structure as claimed in claim 4 in which over a lateral section subtending an angle of 180°, the first 90° is taken up by two arcs of different radii and the remaining 90° is subtended by a mirror image of said arcs.

6. A building or the like structure as claimed in claim 1, 4 or 5, in which the outer faces of the slabs are protected by a weatherproof covering of overlapping strip formation laid across the joints of laterally adjacent slab sections.

7. A building or the like structure as claimed in claim 1 in which interior wall boarding is applied to the slabs by connection to the innermost edges of the flanges so as to leave cavities between said boarding and the slabs.

8. A building constructed as particu-

65 inr slab in which wooden flanges,

larly described with reference to Figures  
1--7 of the accompanying drawings.

9. A building constructed as particu-  
larly described with reference to Figures  
5 8--12 of the accompanying drawings.

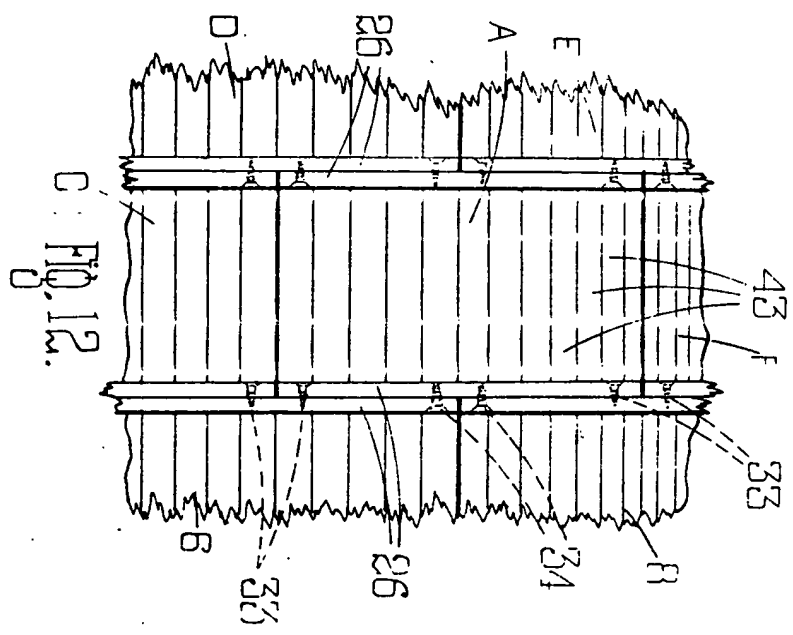
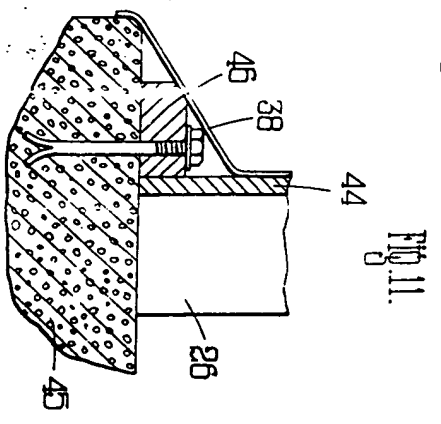
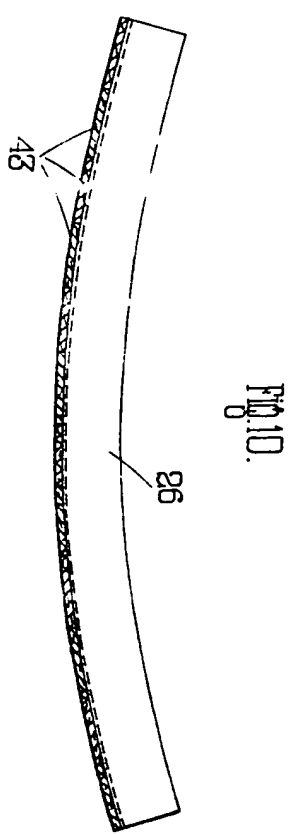
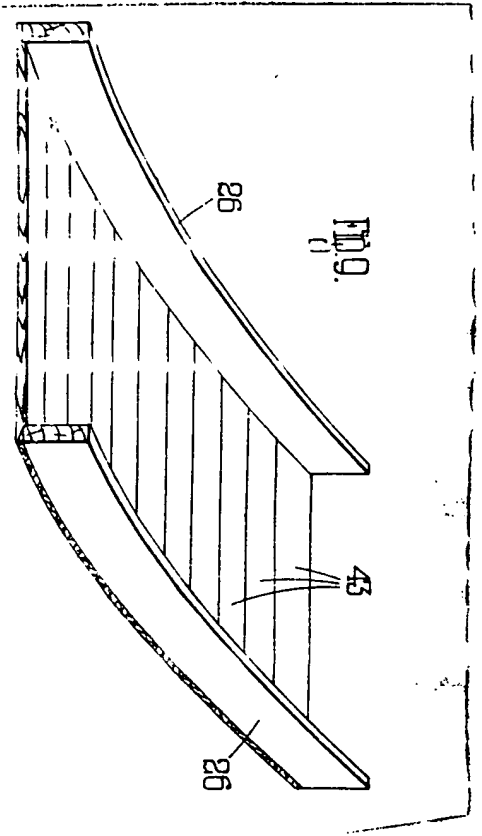
Dated this 4th day of February, 1941.

W. P. THOMPSON & CO.,

Friary Chambers, Whitefriargate, Hull  
and

12, Church Street, Liverpool, 1.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1941.





BRITISH

5-10, 831

~~50~~ ~~61~~ ~~2~~

52/16

LISTED

1741

~~30~~  
61

SEE FIG. 1

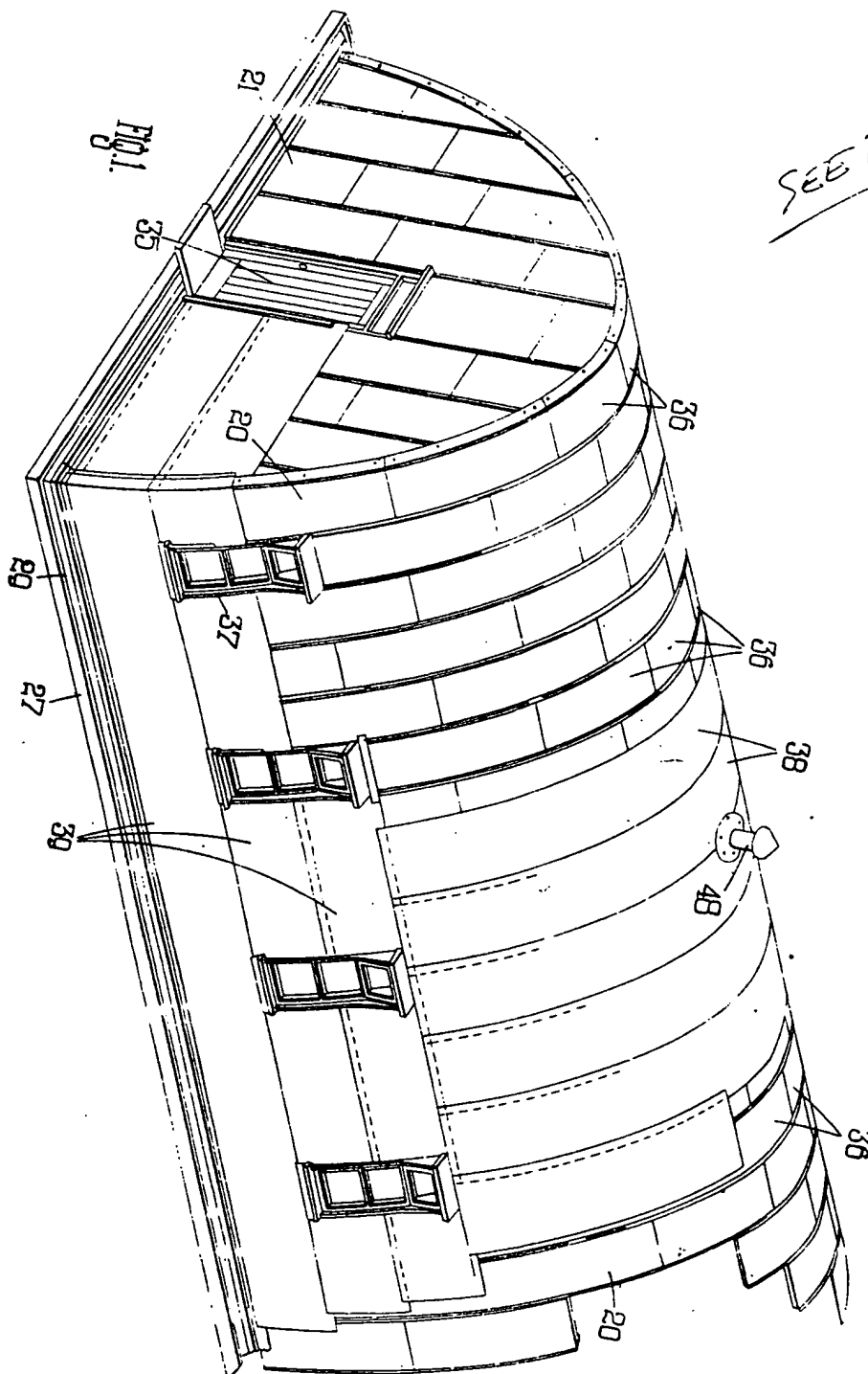
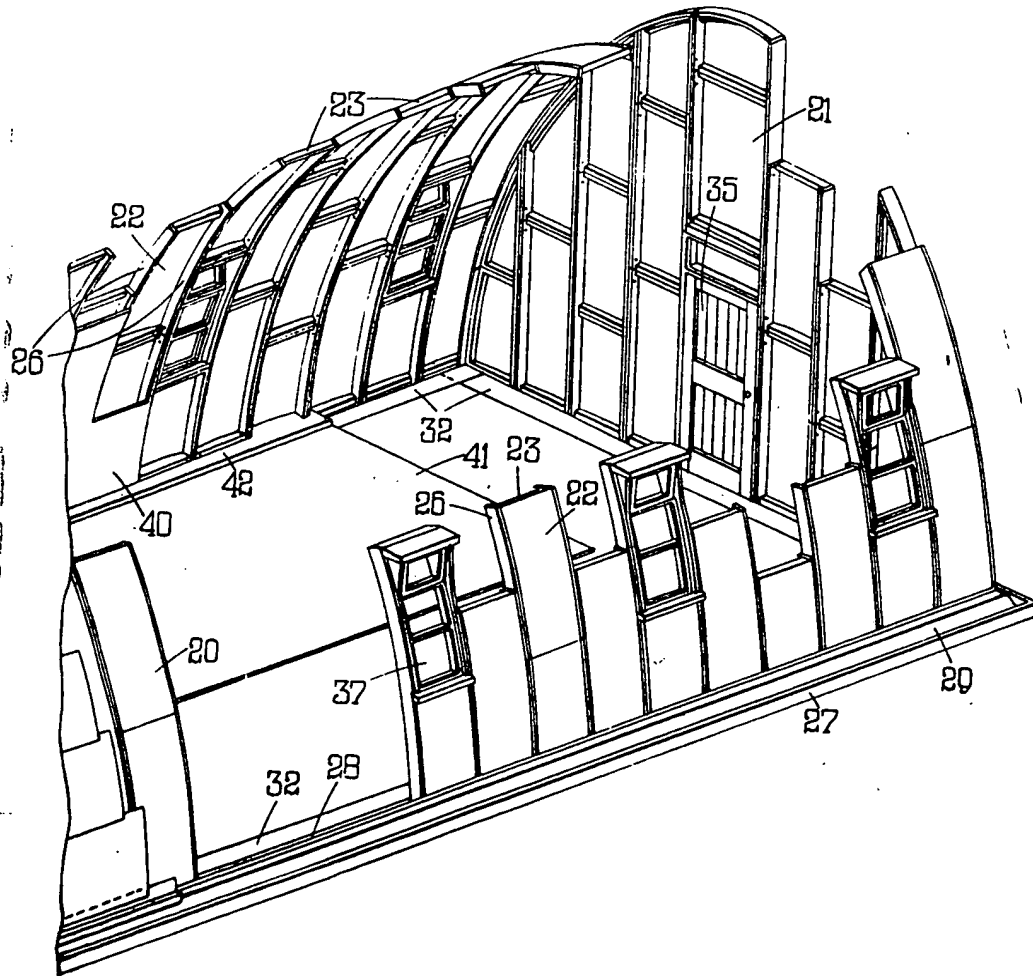


FIG. 2.



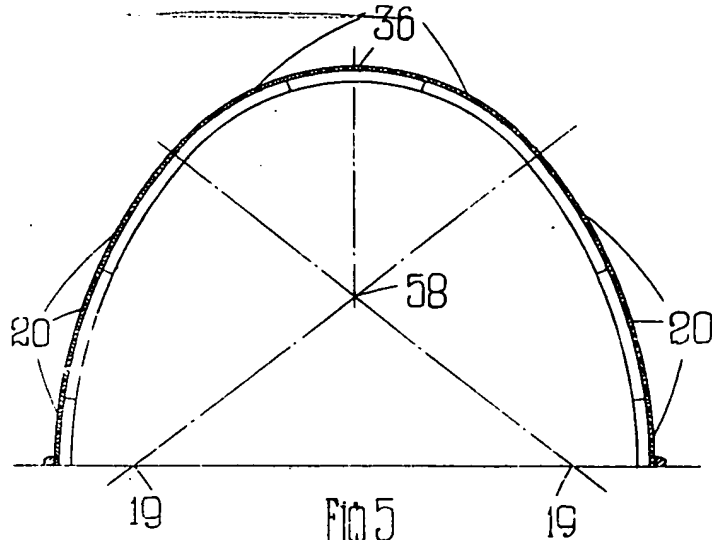


FIG. 5.

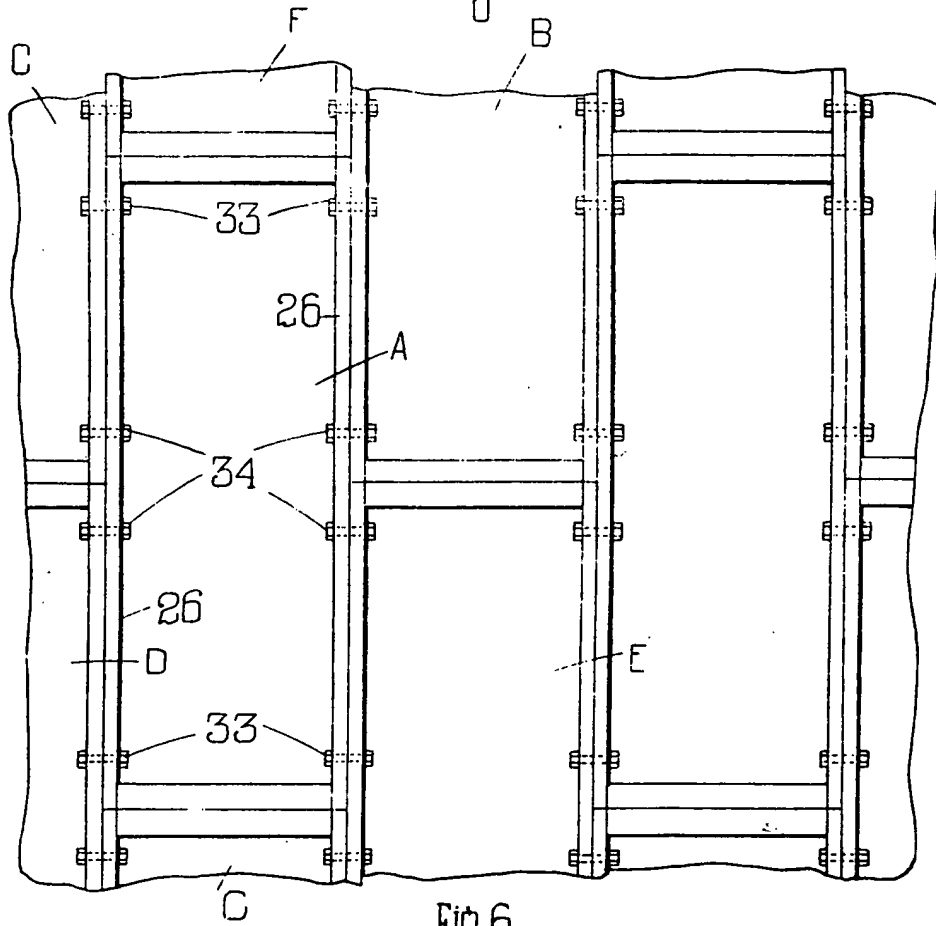


FIG. 6.

